Then why object to the earth as a third body? We, for our part, thank the Lord for the Earth! We are satisfied with it!

Yes, but the balance compares the forces with which the earth pulls on two bodies—the weights of the two bodies. Very true, but just here is involved the one thing above all others which makes physics a mathematical science, and it is a thing which many of our mathematicians seem to think least about, namely, the establishment of invariant one-to-one correspondences by experimental tests. Use a balance on a batch of sugar and you get always and everywhere the same numerical result,[1] use it on a part of the batch and you get a different result. This is the only condition that is necessary to justify the use of the result as a measure of quantity of sugar. The purely arithmetical condition that ten units of sugar break up into a batch of seven units, and a batch of three units might also seem to be a necessary condition, but it is not necessary, but only convenient, in that it leads to a simple system of sugar-arithmetic.[2]

[1] This statement is somewhat idealized for the sake of simplicity. If the use of the balance did always lead to invariant results, the rational theory of the balance would be of interest to the balance maker and to the speculative philosopher, but it would be of no consequence whatever to the experimental or mathematical physicist. As things stand, however, the rational theory of the balance is of importance in the elimination of what we call systematic errors, for under ordinary conditions the balance does not lead to invariant results. Many such cases arise in physics, and it is the common practise to keep clear of such complications in the earlier stages of the development of physical theory by framing definitions on the basis of ideal conditions.

[2] As an example of the kind of thing here referred to let us agree to measure "amperes" by the number of units of heat generated in a given wire per second. Then 3 "amperes" from one branch of a circuit joining with 2 "amperes" from another branch would give 11.9 "amperes" in the main circuit. In this system the arithmetical form of Kirchhoff's law would be as follows: The current in the main circuit is equal to the square of the sum of the square roots of the currents in the various branches of the circuit. Similarly sugar could be easily measured so that you would pay 5 cents for one unit, 7 cents for two units, 8.65 cents for three units, and so forth, without making the serious mistake of giving your sugar at a cheaper rate to the wealthy man who gets more than he needs than to the poor man who needs more than he gets. Figure it out for yourself.

We respect the experience of two thousand years in that we base our definition of mass on the use of the balance; and we look at the identity of inertia ratio and mass ratio as a discovery, but we refuse to depart from the point of view of men who buy flour and sugar by the pound. We are not ashamed of the balance!

We also respect the broader view of mathematics as the logic of fixed relations in our acceptance of experimentally established one-to-one correspondences as the essential basis of mathematical physics rather than the mere readings of numbers on sets of weights, and yard sticks and clock faces!

W. S. Franklin,
Barry MacNutt

POWDERY SCAB OF POTATOES IN OREGON

The occurrence of the *Spongospora* scab disease of potatoes in Tillamook County, Oregon, has recently come to the attention of the department of plant pathology of the Oregon Experiment Station, and since this important trouble has apparently not been reported west of the Rocky Mountains the record may be of general interest.[1]

The lot of potatoes in which the disease was first found was raised on a farm in the rather isolated coast district of Oregon referred to above. The owner stated that the seed of this variety had been introduced from twelve to fifteen years ago from an eastern state and that new seed had not been introduced on his farm since that time.

The diseased tubers first found came from a lot that had been shipped to the writer for experimental study, this particular lot being badly affected with an internal browning apparently of non-parasitic origin and with the

[1] Since the above was written a record of the appearance of this disease in Seattle on potatoes from British Columbia has been reported.

Verticillium wilt. The variety was characteristically rough and the powdery scab pustules were not easily detected; in fact only one specimen was noticed at the time the tubers were being cut when examination was made for the other trouble. This specimen was laid aside and examination was not made for several days, when the identity of the disease was established, April 26, 1915. On reexamination several other specimens were found in this lot.

A rather hasty survey of Tillamook County was made at once (May 3–8, 1915) and, except on the farm from which the specimens above noted had been sent, only one specimen was found. This specimen was picked up in a grocery store in Tillamook with no possible chance of tracing it to the grower. At the farm from which the first lot was received about two dozen specimens were found on examining about three bushels of potatoes.

The fact that the district is isolated and that potatoes are not raised in sufficient quantity for export possibly has been a natural means of preventing a more general dissemination of the disease.

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AGRICULTURAL EXPERIMENT STATION,
CORVALLIS, OREGON,
July 10, 1915

SCIENTIFIC BOOKS

Spencer Fullerton Baird. A Biography. Including selections from his correspondence with Audubon, Agassiz, Dana and others. By WILLIAM HEALEY DALL, A.M., D.Sc. J. B. Lippincott Company. 1915. 8vo, 462 pages, 19 plates.

Dr. Dall has conferred a distinct and lasting benefit on American science and letters by his presentation of the life of one of America's most eminent and beloved men of science. In the twenty-eight years that have elapsed since death terminated the career of Spencer Fullerton Baird, his fame has not diminished, the respect in which he was held as a man and scientist has not abated, and his example has been an inspiration to thousands. For no previous biography has anything approaching completeness been claimed; and it is safe to say that posterity will demand nothing more than is herein contained, for no subsequent biographer will have access to any essential facts or data that were not available to and utilized by Dr. Dall. Chief among the sources of information were Professor Baird's journal, extending, with certain breaks, from 1838 to 1887; letters selected by his daughter, which for the period prior to 1865 are mostly from his correspondents, as the official archives and Baird's own official letters were destroyed in the burning of the Smithsonian building in that year; reminiscences written from Miss Baird's dictation; and a mass of miscellaneous documents and notes that had been collected by Mr. Herbert A. Gill, who for many years had been associated with Professor Baird in the work of the Fish Commission.

The volume is with great propriety dedicated "To the memory of a devoted daughter, Lucy Hunter Baird," the only child of Professor Baird. It was she who began the collection of material on which she intended to base a memoir of her father; and it was she who, finding that she would be unable to complete that task, devised her own and her father's papers to the executor of her will with the request that the "memoir be completed by a suitable and competent person."

The task and the honor of writing a biography of Professor Baird could have been entrusted to no person more competent and sympathetic than Dr. Dall, who, as stated in his preface, had known Professor Baird since 1862, had had the benefit of his teaching and example from 1865 to the time of his death, had enjoyed the hospitality of the Baird home, and from 1869 had knowledge, at the time of its occurrence, of much that is recorded in the biography.

The biographer makes no attempt to enumerate or analyze Professor Baird's voluminous publications, which have already been covered by Professor G. Brown Goode's exhaustive bibliography. The author's "chief aim has been to show the man as he lived and worked; with glimpses of his relations to his contemporaries, to the promotion of science, and to great, and as yet hardly appreciated, public services."